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COOP'S TECHNOLOGY DIGEST

-A Timely Report On The World Of Communications-

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Periodic Overview of Technology

In ten issues each year averaging more than 200 pages of finely spaced text, the actual trend and status of new technology impacting upon older styles of doing business can be easily lost in the sheer "word count." In this issue, we summarise the status of the various ever developing technologies as of mid-April 1997. Topics are alphabetical by key words (i.e., "Convergence Standards") with special emphasis noted for technology that has a predicted early impact on New Zealand and Australian telecommunications.

APV / Australasian Programming Venture

Originally announced, quietly, by United International Holdings (UIH) in March 1996, this was to be a 10 channel cable programming service built around household North American and European cable service names and delivered in PAL format with some attention to our local time zones via Intelsat (C-band) satellite before the end of 1996. It did not happen, for a number of reasons. Foremost - the Intelsat arrangements are dependent upon the launch of a new (800) series of satellites to the 174/177/180 (east) geostationary locations. This new satellite program is now running more than one year behind schedule. Reason number two: The programmers which UIH would deliver to the Pacific (they saw New Zealand, Australia, Philippines and surround regions as customers for this package of channels) were not as quick to work out the details with UIH as had been initially hoped. Reason three: APV, owned and managed by UIH, is subject to fiscal restraints resulting from UIH funding difficulties following failure of end of 1996 US\$250m public offering to occur on schedule. More recently, UIH board approved US\$9m start-up fund for launching of APV service, but project still must await Intelsat sorting out their now badly derailed launch schedule for new 800 series satellites. Latest problem to resolve: UIH is not certain it can or will be able to offer the 18 channel programming package to cable firms not owned and controlled by UIH, in New Zealand. They do not wish to sell their product to direct competitors such as First Media or Sky, and under 1994 New Zealand Copyright Act believe they would be forced to sell to their competition if they sold their service to anyone other than Saturn (which is owned by UIH). At risk here - several planned but not yet operating cable systems who are basing their entire reason for existence on the availability of the UIH 18 channel package.

Cable Digital TV

Cable, like terrestrial TV, currently depends upon somewhat antiquated analogue transmission format to deliver TV programming from headend to subscriber homes. Cable as an industry would like to replace all analogue equipment with digital equipment as quickly as possible. Reason one: an increase of 400 to 600% in channel capacity after switching to digital; reason number two - total channel by channel control over which programming each subscriber receives and automated billing for the programming selected by viewer. Alas, the cost of converting cable systems to digital is proving to be quite significant - upwards of US\$800 per subscriber home inclusive of new digital set-top decoder (IRD) box. Moreover, the hardware required does not yet exist in anything approaching mass production quantities nor at anything approaching mass production pricing. Some unresolved technical questions relating to cable TV

system adoption of digital transmission techniques: Broadcast TV has adopted technology known as "VSB modulation," while cable designers favour competitive and non-interchangeable "QAM modulation" technique. Variations of QAM include 64-QAM, 256-QAM. VSB is more robust in presence of noise, but inside of cable environment QAM gives user more programme channels per megahertz of bandwidth. 256-QAM, for example, can compress two separate HDTV (high definition TV) services into space presently occupied by single low definition analogue TV service - or - single VSB high definition TV service. Cable will therefore take terrestrial (and satellite) VSB signals, change them into QAM technique before sending the digital signals to home subscriber set-top IRD units. This means cable equipment will always be non-compatible with everything else sold in the marketplace - including terrestrial digital TV sets of the future. None of this is making the cable changeover to digital less expensive. Scientific-Atlanta believes the IRD unit should be outside of the home and has introduced 4 and 8 port addressable interdiction units which eliminates the need for in-home set-top boxes. Most major cable operators see digital as not merely another (better) way to deliver TV programming, but as their entree into high speed two-way data and telephone services. One early model system now functional is located at Hartford, Ct. (USA). Supplier General Instrument claims 24 digital headends installed for North American cable operators by April 1st, says up to 70 additional digital headend conversions are scheduled by June; this in a universe of more than 7,000 cable systems. The primary bottleneck remains in-home (or out of home) set-top digital IRD units. GI has managed to ship 200,000 in a universe of nearly 68,000,000 cable TV homes - to date. One plan to overcome significant capital cost of replacing all analogue set-tops with digital units: US\$10 per month "lease" plan (per set-top unit). Cable operator must, of course, then figure out how to make money with this new overhead added.

Cable Television

Cable in New Zealand is not doing as well as had been projected one year ago. There are multiple reasons, primarily relating to the scarcity of "free market" programming. Sky is partially to blame but not totally so.

Far North Cable TV Ltd is slowly building out the communities of Mangonui and Coopers Beach (finished) plus Cable Bay (underway) and Taipa (May start) to pass 1,165 homes using straight coaxial cable techniques. The system presently delivers 38 channels of television with five subscriber levels including a "Sky Sport Only" tier. Subscriber pricing ranges from \$25 ("Basic" - 15 channels) to \$75 ("Premium + Sky"). Far North has not at this time found the addition of Sky Sport resulting in significant increases in home penetration which is running at 24% after 15 months of operation. The company has announced plans to begin construction in Kaitia (1,350 homes to pass) and KeriKeri (820 homes to pass) before the end of this year. Far North carries TV1, TV2 and TV3; there is no Sky service available in the cable areas (except the new Sport satellite service).

First Media (FM- Telecom cable TV) is not certain it is in fact a cable TV company, with internal forces tugging at the hybrid fibre optic and coaxial rollout. One faction wants cable TV to be the driving force, the other sees cable as merely a bandwidth occupant and playing second fiddle to data streams on the same plant. For now, the two opposing sides are about equal in corporate persuasive power but long term it appears the broadband people will beat the television people. FM will not release the number of homes passed with active plant, nor the subscription count. The latter number would be under 3,000 according to industry consultants. The FM programming line-up is not attractive to consumers and the pricing is high by any standard. FM carries TV1, TV2 but has not come to a carriage agreement with TV3. FM is largely concentrating on suburban districts of east Auckland, and must compete with free to air and Sky services available to rooftop aerial viewers. FM has said it intends to compete with Sky by specialising in recent release movies on a staggered (NVOD) show schedule; in truth, they will be competing with the corner video store more than Sky.

PacSat is a "family" of cable systems operating in Greymouth and Gisborne at this time, planning systems in other communities including Whangarei. PacSat is largely controlled by Civic Enterprises, a

Christchurch concern in turn controlled by attorney John G. Rutherford and son Damon. The Greymouth and Gisborne systems utilise a Rutherford created point to point microwave system which replaces normal coaxial cable trunk lines with modest cost microwave. The advantage is that a community can be activated in a shorter period of time without digging up streets or securing pole attachment agreements for stringing of cable. The disadvantages include a limited channel capacity (7 TV channels, typically). Gisborne installed a privately designed microwave relay system to bring Sky Sport and Sky Movies to the community for redistribution via PacSat in the last half of 1996. Having "Sky" services available made a dramatic difference in subscriber interest for the system there. PacSat Greymouth subsequently began taping Sky Sport and Sky movies in Christchurch for one week delayed cable distribution. With the recent start-up of Sky Sport on satellite, both PacSat systems now take Sky Sport directly from satellite. The Greymouth system reported "more than 400 new subscription enquires" following the announcement that it would be carrying Sky Sport "live" after mid-April. Greymouth has another problem as well - there is no TV3 coverage in the community and sporting events carried on TV3 miss Greymouth. PacSat has been able to fill some of these missing events by locating satellite feeds from services such as Papua New Guinea but largely is unable to provide a complete television service to Greymouth at this time. Neither Greymouth nor Gisborne carry terrestrial TV1, TV2 nor TV3 services on cable; another downside of having only 7 channel capacity on their systems. Sky is not directly available (other than new Sport channel via satellite) in the PacSat communities.

Saturn Communications (previously Kiwi Cable) announced a \$40m expansion project one year ago. Since that time hundreds of kilometres of coaxial cable has appeared on power company poles through the Hutt Valley and Wellington. Not very much of this cable has been connected to electronic equipment, even less is actively capable of serving homes at this time. Saturn kicked off service to selected Wellington suburbs in mid August (1996) and has largely disappeared from the marketplace since that occasion. New cable construction appears to have significantly slowed and the company is offering around 20 channels of programming at this time but only in limited areas. Part of the reason for the slowdown may be traced to a failure of owner United International Holdings (UIH) to successfully float a US\$250m capital raising venture during the fourth quarter of 1996. Another reason for the apparent slowdown in cable construction could be the highly capital intensive requirements of Australian MMDS and cable TV holdings. UIH was a participant in an emergency financial rescue of partially owned Galaxy (DTH TV) this past August and may have had to put as much as US\$90m into Galaxy at that time. A third reason for the slow down is perhaps the failure of UIH to bring into the marketplace additional cable unique programming which the company had announced in March 1996. This 10 channel US and European originated programming package (more recently updated as 18 channels) was to provide Saturn with a programming foundation of sufficient uniqueness to make Saturn Cable significantly different than competitor Sky pay TV in the marketplace. Within the present list of 18 channels is an "Euro-Pacific Sport Channel" which UIH claims will have "significant New Zealand and Australian content" as well as three unique to cable movie channels. The status of this programming package remains uncertain (see "APV" here). UIH's new cable plant construction in the Wellington region has not progressed significantly during the past 8 months and the number of subscribers to the system is a corporate secret; we estimate under 5,000 actual paying subscribers at this time.

Taupo Cablevision, Inc. (TCI) is a Canadian owned system passing approximately 1/3rd of the homes in Taupo with around 20 channels of television. The system has been handicapped by the presence of Sky via local UHF repeaters and that many of the cable intended programming sources such as Discovery and TNT + Cartoons are managed by competitor Sky. System owners are attempting to increase the capitalisation in the system and have been advertising widely in New Zealand financial journals seeking upwards of NZ\$1m for completion of the present system plus additional funding for new systems in Rotorua and elsewhere. TCI does carry TV1, TV2 and TV3 as well as the regional Horizon station (which is not available to Taupo residents except through cable).

CE and PC Convergence Standards

Consumer electronics manufacturers and personal computer designers may not be certain exactly how they will end up as a single commercial product entity, but both sides are co-operating to create a road map to get them to that point. Step one: Agreement on standards of interconnection.

The TV industry is driven by deeply cut profit margins and a shift of production from developed to emerging countries. The PC industry is driven by the clear notion that television when totally digital will be closer to PC than present broadcast technology.

Big screen TVs now entering the marketplace for the 1998 season will be the first to see the co-operative effort. Standards pushed by Compaq and Thomson and supported by Hewlett Packard, Hitachi, IBM, Intel, Microsoft, Mitsubishi, Philips and Toshiba will establish guidelines for consumer large screen TV sets doubling as PC displays as well. At the heart of the challenge, developing connection methods and handshake communication language that will allow the PC to "talk" to the TV display system. For TV makers such as Thomson, they are adding a bonus to their TV receivers - giving very large screen displays to the computer users. For the computer folks, getting the large master family TV into the computer world is a first step to marrying the two now foreign technologies.

A PC-monitor VGA port on the TV's jack panel is step one. Next up - adapting the Universal Serial Bus (USB), the IEEE-1394 "fire-wire" digital interface and standardising wireless connections and infrared remote control protocols (see "Infrared Standards" summary, here).

Users will find new combo units seamless when switching from TV to computer uses. Selecting PC mode in infrared remote will cause image to shrink on screen 15% (to prevent edges from being lost on PC displays), contrast to reduce by 15% to reflect higher intensity of PC displays. One Thomson 36" combo model converts NTSC to VGA to get around the interlace scanning versus progressive scanning problem by using line doubling technology.

Subset: Microsoft says it will incorporate USB support into the next version of Windows 95 (scheduled for 1998 and presently code named Memphis) while Intel says the next family of processors will include data lines to directly interface PC and TV display functions. USB may be most important element in the new convergence technology planning. Here is how it works. To add peripherals to PCs requires opening PC case to plug-in new board(s) and then spending some (often considerable) period of time interfacing software language of new board with master language of the PC. With next generation PCs, equipped with USB feature, external (outside of case) jack will accept new peripheral board or plug-in (such as a DVD player) while simultaneously the USB software will automatically marry the new board and functions to the advanced Windows operating program. Net effect - plug and play additions of virtually anything to the PC, all automatically without having to learn new software routines or languages.

Digital Audio Radio/DAR

Just as digital conversion is pacing all facets of television programming distribution, so too will it also impact on radio broadcast world as well. Digital (audio) radio is simplistic concept - replace existing individual terrestrial radio stations (AM or FM) with a "broadband" satellite service that delivers upwards of 50 separate "audio programme channels" to properly designed receivers. Because of the international reach (coverage) of satellites, most services planned will rely upon subscription revenues rather than advertising. World authorities have been slow to assign specific frequencies for this purpose, resulting in DAR lagging behind similar developments in (digital) TV via satellite.

DAR systems are being planned for 1998-2000 operation to serve Europe, North America, and Asia; the Pacific region is not yet on anyone's drawing board. Most of the system planners are implementing "both ends" of the circuit - creating satellites to broadcast and designing for manufacture receivers which will pickup the new transmissions. Initial receiver orders in the 1 to 5 million piece region have been announced with consumer pricing in US\$100 range for a complete receiving system. Services will operate in 1.5 GHz (L-band) and/or 2.3/2.5 GHz (S-band) region, receivers will be size of today's handheld transistor portables but may not be capable of performing unless connected to vehicle rooftop

or home "rooftop patch" antenna. All DAR services claim they will be "CD quality," most say they will be commercial (even announcer) free. World short-wave broadcasters such as BBC are positioning themselves to be a part of the various "DAR bouquets" that are planned.

USA firms that will serve North America include Satellite CD Radio and American Mobile Radio. European countries experimenting with DAR are considering combination of satellite and terrestrial relays. Germans have built test system fashioned after cellular telephone practice with new "radio cell site" every few kilometres in urban areas, switching to direct satellite reception in open regions. UK version is now functional in 230 MHz (VHF) region and British are trying hard to convince other countries to adopt their technology rather than satellite and terrestrial microwave delivery techniques. Australia has experimented with L-band microwave terrestrial delivery, is expected to adopt similar system to Germans.

Subset: Unlike television switch to digital from analogue, there are few voices calling for elimination of existing analogue terrestrial services after DAR or something similar is in place. DAR is seen as simply another, perhaps better, way of transmitting music, news and information to often mobile listeners but not necessarily to replace AM and FM broadcasting. Exception: UK plans to close down all existing AM and FM transmission facilities at some yet uncertain date after their 230 MHz digital audio coverage is nation-wide in character.

Digital Still Cameras

They began as novelty, graduated to form of photography which could easily be married with software to computer imaging, now threaten to "evolutionise" the way common people shoot and store "still" images. The supplier line-up which began as an offshoot of the photo print world rapidly is taking on the image of virtually another consumer electronic product: Casio, Epson, Hitachi, JVC, Mitsubishi, NEC, Panasonic, Samsung and Sony are among the brand names recognisable.

The industry claims 1,200,000 cameras sold in 1996 (a number too small to be significant in the consumer electronics world), anticipates 1,900,000 cameras in 1997 and projects 6,000,000 in 2000. Cameras embody essentially same technology as latest handheld VHS or 8mm video cameras only less of it and the promise of significantly better per-unit profits for at least the early days. System uses electronic image maker, lens system, electronic amplifier and recording base. Until very recently, most expensive part has been CCD (charge coupled device) image maker; same CCD technology as found in video cameras. Latest development is CMOS (complimentary metal oxide semiconductor) image sensor which is cheaper, perhaps better than CCD imaging systems. Price cuts possible with CMOS may result in 50% lower retail within two years. Average factory price in 1996 was US\$283, projected to drop to US\$246 this year and US\$177 in 2000.

Cost alone may not be the driving force for product. Hewlett Packard is focusing on "virtual darkroom in PC household" - no chemicals, no mess. To merge technology between existing print film and new PC based technology, HP is introducing new film print scanner to load memory of prints into PC or onto disc, as well as a new photo-print-specific colour printer. To give PC processed prints look and feel of old fashioned film prints, HP is also introducing new photo-thick paper stock.

Near term the arguments may come down to quality versus quantity: Film prints still have considerable definition (pixel detail) advantage over electronic photo methods, but higher resolution electronic imagery is just around the corner. To that end, Vivitar's ViviCam 3000 offers 1,000 x 800 pixel resolution with 30 bit (one billion hues) colour. Competition in the electronic world typically offer 640 x 480 pixel resolution. With improved CMOS resolution, significantly better low cost billion hue printers, the gap between "natural film prints" and all electronics prints will narrow significantly during 1997. Longer term, even Kodak is betting on an electronic solution to still photos.

DTH / Direct To Home

How many DTH subscribers does it require to be at break-even or better? Surprisingly few if results to date are any indication. Of course there are variables such as raw programming costs, satellite and uplink

costs, and promotional considerations. There are apparently financially viable DTH services with as few as 100,000 paying subscribers (which generally translates to US\$5,000,000 per month gross receipts); and there are others running big time in the red ink column with five times that number of subscribers.

The trend is for programmers to spread their services over as many non-competitive DTH service providers as possible and depend upon the service providers through subscriber identifying conditional access routines to stay out of each other's "territory." Programming costs are still adjusted by market viability - India, for example, gets sizeable rate breaks from programmers such as ESPN because of the general economic level (ability to pay) of the client base. Nor surprisingly, Japanese DTH providers pay more for specific programming than anyone else in the world - except perhaps Australia which presently pays more for movies and sport than anyone else.

Nothing is more competitive than sport and creative sport programmers such as ESPN are working overtime to build audiences for sporting events that previously have not attracted public nor commercial interest. Recent ESPN world coverage events have included 10 year olds in go-cart racing finals and US high school (college) girl's basketball all-star games. ESPN, STAR Sport are number 1 and 2 world-wide and they have formed a joint effort for Asia which effectively means there is no competition there for the near term future. ESPN has pioneered not only taking world sport into a new area (such as South America) but in bringing local sport (such as Argentine Polo, auto racing) back out of an area for redistribution on their world circuit.

All of the big players are presently shuffling for position as the last of the major regional DTH service packages are readying for operation. They include:

1) *ASkyB*. American Sky Broadcasting which now apparently will be known simply as "Sky," has announced merger with earlier entrant EchoStar in North America. EchoStar claims 430,000 DTH subscribers in service that launched one year ago after two early-start competitors had already passed 1,000,000 subscriber mark. ASkyB is Murdoch News Corp firm (in partnership with MCI which owns 20% of ASkyB) planning 200+ channel DTH service package to North America by early 1998. Purchase of 50% of EchoStar gives News Corp earlier start (their own launch depends upon successful completion and launch of satellites still under construction), and joint orbit spot resources of two otherwise competitive players.

EchoStar is relying upon existing C-band satellite dealers as sales agents for service, quite contrary to marketing approach of two competitors DSS/USSB and PrimeStar. EchoStar is perhaps more on leading technology edge than competition: two examples. Firm is partnering with several home VCR manufacturers (JVC and other) to ensure the new D-VHS (digital format VHS tape) home VCRs will directly plug-into latest version DTH receivers allowing viewers to record directly in digital from satellite without going back through quality disruptive analogue conversion. And, EchoStar has unique vision of how DTH should work in North America. Rather than one national beam offering essentially the same homogenised TV services to all viewers from Maine to California, they believe country should break down into regions (75 markets is a starting point suggestion). Each region would have own uplink, bringing all local terrestrial TV (and radio) services from that market to satellite and back down to same market as previously defined by trading area standards. In this way local TV services become part of satellite delivered package. To the local services EchoStar would add several hundred national programme channels as well. To kick this off, EchoStar is committed to US\$500m expenditure to build 8 regional uplink centres. They in turn will feed signals to 3 new satellites scheduled for launch by end of 1998, creating 75 separate spot-beam market centres for satellite services across North America. This regionalisation plan has the full backing of Rupert Murdoch and News Corp, and has also captured the support on terrestrial TV broadcasters who previously saw satellite DTH only as a competitor, not as an adjunct delivery service (described by NAB Chairman as, *"the most common-sense and enlightened approach that has been presented to broadcasters concerning DBS"*). Cable groups are not in favour of plan since this regional delivery of services is basically what cable TV in North America is all about. Origin of "regional plan" may in fact have been Murdoch who in 1995 announced his own plan to create

"regional DTH service" for various Asian markets (such as Indonesia, India, Japan). Next major announcement for ASkyB/EchoStar - selection of two firms to produce the set-top IRD (receiver) unit for service. In running - Hyundai, Matsushita (Panasonic), Pace Micro and Zenith. In past, Pace has been primary supplier for Murdoch involved DTH services (including Galaxy service in Australia) but of late firm has missed numerous delivery deadlines for various new start-up DTH services including Murdoch backed Indovision service. Pace has announced plans to open new North American plant, probably in Mexico, if it wins ASkyB contract.

2) *BSkyB*. The original Murdoch European branded service now claims nearly 6,000,000 subscribers including those served through cable TV feeds. The service is (20+ channel) analogue, plans expansion to as many as 200 digital channels late this year utilising new purpose built master operations centre near London that will feed programming world-wide. Analogue system sales have plummeted in anticipation of digital, BSkyB responding by offering special hardware pricing (US\$200) and programming package deals if subscribers agree to take service for one full year.

3) *DSS (USA)*. With intense competition between programme providers (4 now operating) and hardware suppliers (ten+ now in marketplace), equipment pricing has eroded to US\$200 as benchmark. DSS subscribers are largely coming from rural areas where cable has not reached and increasingly from cable communities where the service is overpriced or of inferior quality. Pricing began two years ago in US\$750 range, dropped to under \$500 one year ago as competition came on line for hardware, then dropped to \$200 when new programmers began to offer rebates on programming that was purchased simultaneously to hardware. Next trend just now underway - benchmark US\$200 price tag for complete home DSS/DTH system without requirement that buyer also purchases year of programming as well. DSS monthly revenue per subscriber averages US\$50 per month according to industry trade association. Industry group forecasts Direct to home satellite will serve 4.4 million (US) homes by end of 1997, up 900,000 from end of 1996; and, claims 322,000 US cable homes will drop cable in favour of satellite this year.

4) *Impact TV*. Kiwi initiative would lease Ku-band transponder space to deliver an initial 10 channels of DBS programming in format generally modelled after the Hughes DBS service in USA, using similar equipment. Project first suggested mid-1995, remains in initial fund raising stage seeking \$35,000,000. Principals have no direct DTH nor DBS experience, are largely associated in peripheral of satellite and broadcast TV business in New Zealand. Major hurdle? No sport, movie programming sources equals less than attractive business plan.

5) *Sky Network DTH*. Single channel analogue encrypted sport only service officially launched April 21st using Optus B1 New Zealand beam 1/2 transponder. Subscribers are being charged \$650 for the first year of service, including reception equipment and installation. Installers purchase LNB (\$55) and 65 cm dish (\$35, or 76 cm at \$45), provide balance of installation hardware less Uniden brand receiver and (SV3A) Videocrypt decoder which Sky provides. Early days installers report they can do 3 comfortably in a day, 4 if the locations are close together. Sky put installations out to bid, most "master installers" in turn have hired local sub-contractors. Labour content appears to be averaging \$80 per installation for most sub-contractors. Subs are supposed to take training in dish installs, provide own test equipment, tools, vehicle and insurance plus warrant installation for 5 years against defects in workmanship.

Marketplace confusion continues concerning what consumers are paying for; Sky initially said "*Sport service is free, consumer is paying for equipment and installation.*" Subsequently, Sky decided equipment was free or at least subsidised and Sky Sport was being charged. Bottom line - consumers end up owning nothing, equipment remains on Sky books.

Single channel sport service is interim, scheduled to grow to 20+ MPEG-2 programme channels by mid 1998. Supplier of MPEG encoding equipment, multiplex programming package and consumer IRDs not yet chosen. Most likely at this time - some variant of Pace model receivers with backup source being Uniden.

-SKY Faces Range of Start-Up Challenges-

SKY's New Zealand beam Optus B1 signal appears to be every bit as strong as Optus planners had forecast throughout North and South Island. At our press time, tests in Chatham Islands using quality 3m solid dish was producing poor results - too poor for commercial (consumer) use. The problem may be fixable but no-one will know until more experienced satellite people go there to supervise testing. Other tests beyond NZ proper: A 3m dish in Sydney produces low quality picture, probably not commercial; 2m on Norfolk Island has similar results.

Test in New Caledonia suggest no reasonable size dish will work there.

Closer to home, first consumer and commercial receivers began installation week of April 14th (Sky testing began April 8). A technical glitch was immediately evident - a grey film drifting across video which turned out to be a problem associated with (Uniden) receiver set-up. If you know of an installation where this problem persists, study

Uniden receiver instructions, switch off "DC clamp" and make sure receiver is set for 625 lines PAL video. In professional grade receivers, DC clamp and filtering should be set to 'off' and video to drive decoder should come from composite output jack of receiver.

Equipment shortages through Christchurch depot were affecting installation schedules on South Island as we go to press. Commercial installations, for motels, pubs and others remain a confused policy area. At least pubs are being told they will have to put up \$650 equipment 'bond' plus pay cost of a commercial install as a condition to being served. Commercial installations typically are using 1.2m size dishes versus 60/76 cm home dishes. Sky management is insisting that all parts of a system, whether for home or commercial sites, must come through them.

This policy is not going down well with C-band home dish system installers who consider their own equipment sources at least suitable for the job. Dish systems installed for C-band, or Australian Ku-band prior to Sky, and wishing to add Sky reception without installing a complete Sky package are being told this is not possible. It is - and Sky may not like how it happens. Since the same decoder cards function for both terrestrial and satellite service, people with existing dishes are signing up for a terrestrial package through a "city cousin" and then simply transporting the smart card to their rural dish site where they insert the card into a decoder they have obtained on the grey market (usually out of Australia where they are available in quantity). Net effect: Sky gets paid for customer (a card is a card is a card) but loses track of where actual customer is located and whether it is a satellite or terrestrial subscription. And - does not "sell" another satellite dish. This will work for the time being, until Sky converts to digital transmission package, and then the fun and games will stop - or convert to the next higher level.

DVD/ Digital Video Disc

Ten years in the planning, five years in the making. Still not a real player in the home entertainment industry. Concept is that video (movies, sport, how-to) material is recorded on CD-like disc and played on customised player as replacement for VHS (or Beta) format tapes. Advantages: Smaller, lasts forever, more easily shipped, potentially better controlled by programme rights owners. Disadvantage: Initial generation will be playback only (not unlike earlier flop "Laser Disc"), will require total replacement of existing VHS (Beta) tape libraries with new video CD discs (not unlike giving up 78/45/33 rpm records in favour of music CDs). Most DVD players claim ability to also play standard musical CD-ROM discs as well.

Major unresolved problem: Programme rights interests insisting that world be divided into "release regions" to accommodate their existing business plan that releases movies first in North America, last in Africa with balance of world filling in between. Discs are small, easily hand carried or shipped "across artificial regional divisions" and to accommodate this demand players will have software that will only recognise discs coded with the correct regional software (i.e., African region discs will only play in African region players with matching software). Downside of such a system: African can purchase North American player, transport to Africa, and load with discs acquired 6 months to year before same films are released in Africa, from North American and European disc sources. North America is called "Region 1" while Asian mainland is Region 2 (other designations not announced); early discs purchased in Japan and hand carried to North America will not play on US machines - proof the "regional coding system" is functional even in its early stages.

Other problems: Although a world-wide technical standard has been agreed upon, major patent battles loom to determine which designer had priority of rights for various software and hardware routines that will eventually become "standard" for world-wide system. And, by being in digital format each disc

possesses "studio grade" original quality which is forcing programme suppliers to insist that anyone watching disc is unable (by technical means) to make their own videotape (VHS) dub of the material.

DVD will be initially promoted as "sell through" rather than rental item, some studios are releasing early discs at US\$19.95 - \$29.95 as "sale item" simultaneous to releasing same films as rental item on VHS tape. Exact positioning of DVD in rental store marketplace uncertain since present tape system allows them to rent tapes multiple times and earn revenue, then at end of rental cycle sell tapes for profit after rental period. DVD's initial plans will preclude rental period income.

Status: Major Asian firms have launched preliminary DVD marketing programme in seven USA cities and some previously put product on shelves in Japan, backed by software from Japanese sources (60 titles are believed available) or in USA largely from Warner Brothers (fewer than 20 titles available). Players range from US\$599 to \$1,000, even Sears Roebuck is carrying players but not titles. Software firms such as Universal say they *"will not release product until all regional coding and copy protection issues affecting company's world-wide DVD software distribution have been resolved."* Players released by Matsushita, Pioneer and Toshiba were discovered to not be capable of reading standard music CDs after initial shipments had been made. Manufacturers claim they knew this going in, said in effect to complaints, "Caveat emptor" (buyer beware). Columbia TriStar Home Video has said it will release 12 films on DVD during balance of 1997, largely in direct support to affiliated Sony release of DVD home players late in April. Estimates of market size vary over wide window stretching from 400,000 DVD players in 1997 world-wide to 11 million annually by 2000.

Subsets: Initial inability to home record DVDs, believed to be a serious problem if DVD is to replace VHS as home video medium, is not forever. Re-writeable DVD-RAM format is beyond laboratory curiosity stage but not likely to become home consumer product before 2000/2002. Two consortiums have working prototypes, both suffer from limited capacity (2.6 Gb, below 4.7 Gb capacity of playback only DVD and DVD-ROM titles). Principal developers are Matsushita and Toshiba as partners against Sony and Philips.

D-VHS (Digital VHS)

Delayed introduction of direct digital recording VHS consumer products is finally coming into focus. First camcorder and home VCR units in digital format were shown 1995. First models into marketplace typically record 5 hours of digital bit stream data on T160 tape, also function as standard analogue recorder and playback device, and can be configured to record computer data with 45 Gb storage on T160. First brands now releasing models include Hitachi and Thomson with JVC promising September release. Low-end Hitachi model is priced at US\$599 list. Primary initial market is believed to be as recorder for DSS/DBS MPEG digital TV transmissions direct to home in USA and elsewhere. By leaving data in digital format and going directly to tape storage without digital/analogue interface, user receives benefits of digital quality without intermediate step. Thomson, which produces majority of home DSS/DBS digital receivers for North America, has designed their VCR so that it plugs directly into satellite receiver for digital recording. There are nagging problems relating to copyright. If consumer uses digital VHS recorder to tape pay per view movies directly from satellite feed, what is to prevent unauthorised duplication (copies) in contravention of copyright laws? Software solutions (no copy, copy one time only) are suggested but there is not agreement on this issue.

Subset: HDTV (high definition TV) digital camcorders are not expected in the marketplace before the second quarter of 1998. DTV (digital but not high definition) camcorders are presently available at the top end of most consumer camcorder product lines.

Ghost Cancelling System by Philips

Problem that has plagued TV reception from date of first broadcasts seemed to be on way to resolution three years ago when Philips announced a digital based signal processor which they claimed would remove all "ghost images" from TV screens. Process involves taking image from aerial, reducing transmission to its original electronic bits, locating the extra bits that cause the ghosts to appear on screen and then eliminating (cancelling) these bits. Philips said solution would be in external set-top box to sell

in range of \$300 initially, but same circuitry would be included in TV sets in future. Tests were conducted throughout world, and we reported such a test conducted we were told by BCL in 1994 (CTD 9502, p. 23). Alas, Philips says it is cancelling the ghost cancellation project. There will be no set-top boxes, no ghost cancel circuits in new TV sets.

Philips has spent millions on product, lobbied for adoption of its vertical blanking interval line 19 "reference signal" and to support the project no fewer than 140 TV stations in the US had converted their TV transmissions to include the special reference signal. Philips conducted a test market in Denver (Colorado) with 1,000 set-top units distributed, and then without elaboration said project is dead. System as initially developed was refined for NTSC only, Philips now claims they have never created a PAL version of the system (which seems to contradict a BCL report that it was testing such a system) and in fact were killing the product because of the expense of completing the engineering for a PAL version. Philips says they are now concentrating only on products which have a global market application and because of different TV standards (PAL, NTSC and SECAM) which would have required three separate models, the project *"fell out of the box."* Philips says it is open to overtures from other firms that may wish to carry on with the research and product line.

New Zealand in particular would have benefited from the product. Our mountainous terrain creates special ghost image problems especially with our lower frequency band I TV transmitters.

HDTV/DTV

The original announced intention of converting terrestrial TV from its present analogue format to an MPEG digital format was to provide the capability for high definition, wide screen transmission formats. Subsequently when it became clear that digital offered coverage and production efficiencies which analogue cannot, the emphasis changed from "better TV" to "more TV" (in the same spectrum space).

Japanese analogue format high definition TV has been a non-event, although available via satellite to Japanese subscribers for more than five years. Most broadcasters now believe the future of digital is not in providing better images but in providing more images; doubling or tripling up the number of individual programme transmission channels than can be accommodated through a single transmitter system.

A number of countries have established timetables for the conversion of analogue to digital, simultaneous feeding of programming using both transmission systems until some future point where the analogue services can be simply shut down. This is causing numerous financial and engineering problems. To simultaneously transmit programming in both formats requires parallel, expensive, duplicative transmission systems. Initially the digital format will have few viewers; ultimately the to be retired analogue will have few viewers. In between those two points may be five to ten years.

It is in that interim that the costs mount and transmission channels must somehow be found to support both. New Zealand is especially vulnerable to the cost challenge given the very large number of analogue translator or repeater stations maintained by all three national networks to reach isolated pockets of population.

In the USA, significant government pressure has established a deadline of 2006 when all analogue TV transmissions would ideally cease and only digital transmissions would continue. In the UK, there is a less certain date but 2010 is often mentioned. Throughout Europe different countries plan the demise of analogue at some point prior to 2012. The USA will begin significant HDTV/DTV transmissions in 1998 but manufacturers and distributors there believe it will be 2002 before a new TV set sales tip in favour of digital from the present analogue format. CBS network says it will concentrate on offering only HDTV service by 2002, will not even plan equipment for standard definition "digital TV." Network will produce HDTV in 1,920 x 1,080 interlaced scanning format, plans to begin sending prime time programming in HDTV in 1998-1999 season.

When analogue transmissions do cease, the present analogue transmission channels will become available for new (non-TV) users; a windfall for those countries that now routinely sell off transmission frequencies as a means of raising capital for government operations. Cellular telephone, business

two-way radio, expanded FM broadcast radio and a myriad of new, special purpose users are already in queue seeking an opportunity to purchase these presently-analogue-TV frequencies.

Unresolved technical issues: HDTV has its own set of technical standards, not universally supported. One major problem involves how the high definition digital image is "painted" on the screen to create an image. In the TV world, a system called "interlaced scanning" has been used since the 1930s. Interlace paints an image twice, all of the odd numbered lines in the first pass, all of the even numbered in the second pass. In the computer world, images are painted using a "progressive scanning" technique - line 1 followed by line 2 followed by line 3, until the screen is full and then the process repeats. Broadcasters are insisting they will continue to use the "interlace" technique with digital, computer people who see the line dividing TV and computer images blurring want their progressive technique to be used. If the computer people win this one, every home PC will automatically become a HDTV receiver whereas if the TV people win, the HDTV universe will start off at zero sets in public hands pending sale of the first purpose built receivers.

New Zealand has no official plan for conversion to digital, leaving this decision to the broadcasters. Australia has formulated a plan to begin parallel digital transmissions by 2000. At some point New Zealand will be forced to deal with this issue because as analogue TV transmissions are phased out world-wide the TV receivers that will function with analogue will also disappear from the marketplace. TVNZ and TV3 both have digital studies underway but no announced plans.

Subset: If terrestrial broadcasters will utilise digital technique called VSB modulation and cable will use totally different QAM technique, will TV receiver manufacturers be forced to build receivers that can do both? The answer is not clear but logic suggests that new digital TVs will be forced to do both QAM and VSB (see Cable/Digital TV, here).

Image Makers

Original revolution in shoulder carried TV cameras, later camcorders, began with miniaturisation of image sensing tubes (vidicons) to physical sizes which suited consumer size products. When CCD (charged coupled devices) came along as better image sensor (greater sensitivity, greater quality, smaller size and price) camcorders shrunk and became "palm" or "hand" -corders. Now the next phase of image sensing evolution is upon us. CMOS (complimentary metal oxide semiconductor) devices show every indication of replacing CCD image devices within 18 months or less. And they are, again, better in quality, smaller, cheaper and more rugged.

Net results is portable video recorders, digital still cameras, closed circuit TV cameras will shortly be smaller, more sensitive, lower in cost. Primary advantages for system designers include physical smaller size (1/4" image pickup surface versus typical 1/3rd" CCD), lower operating voltage requirement (5V versus 9 to 15 volts for CCDs), simplified power supply design (one common voltage versus three separate voltages for CCDs), and on a size for size basis 30 to 50% greater resolution (definition) capability than CCDs. Plus, CCD technology has about run its course in refinements while CMOS technology promises further breakthroughs in all design areas, especially in image resolution. It is the latter which will ultimately drive the next generation systems (see Digital Still Cameras, here).

Infrared "Standard"

Increasingly hand held remote controls are being designed to operate more and more consumer and business communication tools. Infrared transmission and reception standards have largely eluded organisation; each equipment designer essentially reinvents or borrows from designs previous to his own.

Now comes a plan to create an international infrared standard establishing universal codes to allow all remote control devices to communicate compatibly and at high data rates (speed). Backing this move are the likes of Hewlett Packard, Intel, Logitech, Microsoft, Philips, Sharp and others. Conceptually, individuals would have their own infrared remote control or joystick which they would carry with them as faithfully as they now carry credit cards or a hand calculator. Each unit would be personalised with the signature and interests of the owner/user but through universal codes could be used with any equipment that follows the standards under development.

New code will make it possible for cross-platform interactivity establishing a virtual pipeline that connects different services and environments. Example: Wireless keyboard would instruct Web-browser TV to send pages to IR operated printer. And because control IR is a 2-way link, printer would have previously beamed necessary drivers to set-top box or portable/desktop PC determined by user. Within planned standardised format is opportunity for much greater IR link data rates; as much as 60 kbps is practical (current wireless keyboards are limited to range of 1.2 kbps). All of which says when universal IR links are available, more complex control programmes running various separate non-wire-linked devices in same room or region will talk between selves faster, once again increasing the speed of commerce and industry.

One obvious advantage; office or home facility can add or subtract new peripherals by simply taking them out of the box and connecting to local mains source. Subsidiary business of wiring offices for control links, complicated and ever growing demands on wire control systems will simply go away when wires are replaced by IR links. Also under-development; "beam benders" that allow IR links to travel from room to room, floor to floor without elaborate hard wire connections.

Near term goal? Turning infrared remotes into "Magic Wands" capable of shooting instructions between non-wire connected equipment and forcing them to interconnect on their own IR links at command.

Subset: See "CE & PC Convergence" summary, here.

IRDs for Cable, Satellite

Set-top units designed to receive digital signals whether delivered via cable or satellite, and turn those signals into something an analogue TV set will recognise, are woefully short in supply. Worse yet, the design seems to change in 30 day cycles as new software routines are developed by the various IRD suppliers.

The set-top world was dominated by General Instrument, Scientific-Atlanta and British Pace until late in 1996; then Nokia, Philips, Hyundai and several Taiwanese firms entered the field with a promise of mass production capabilities that neither SA nor GI seemed inclined to deal with. Virtually all set-top units could be used interchangeably for either satellite or cable; the "guts" which process the digital signals to analogue output are transparent to the actual input signal type. Therefore assembly lines can switch from cable set-tops to satellite IRDs (set-tops) on fairly short order.

SA and GI are concentrating on the cable industry, Pace has legs in both camps but owes its volume to satellite. Nokia, Philips and the Taiwanese are concentrating on filling supply holes in the satellite world. Hyundai is only now starting deliveries but seems to be courting both camps as well.

Cable set-top units must do several "new" things: Receive and process MPEG digital format signals, provide a transmission interface for high speed (Internet) data to the subscriber, provide a telephone (modem) link backwards to (Internet) or alternately allow the cable subscriber to communicate back to the cable firm office/headend through the cable TV plant itself. There is a great deal of brand new technology here, a major technology leap forward for cable hardware suppliers and system operators.

Satellite set-top units must also have the ability to function as a telephone line modem which allows the satellite viewer to activate software programming on the TV screen to order in specific movie or sport events "on demand." Sky Network (NZ) installations now being done include a requirement that a telephone jack be installed at the location of the satellite decoder to facilitate customer direct ordering in the future.

There are serious supply problems (not sufficient volume to meet demand) and serious engineering challenges to be resolved. Basic problem is rapidly increasing knowledge of software capabilities. Today's design, frozen for production tomorrow, will certainly be overwritten by new, better software routines two days hence. Monthly changes in IRD software models are common, firms such as Nokia have so many software versions that even the firm itself has lost track of what each variation does.

While MPEG-2 was supposed to be a universal "standard," it has not turned out that way. Rather it has become a starting point platform from which every individual firm and often individual design engineers

launch new product. Very few of the software routines driving the MPEG-2 devices turn out to be backwards compatible (i.e., capable of handling all prior formats as well as their design specific new format).

Further complicating the lack of standards is a rush of new independent software writers, primarily in Europe, who are offering customised software routines that can be used to modify the tuning parameters of pre-existing units from firms such as Pace and Nokia.

Major programmers such as Murdoch's Sky are demanding customised software routines for receivers compatible with their own services; Galaxy, Australia, for example has a custom software routine for the Pace model DGT400 receivers it now utilises. This precludes commerce between regions in receivers since a Pace DGT400 designed for Australia with custom software routines is of little or no use in India or Europe where the same receiver uses significantly different software routines.

None of this is going to settle out during 1997. More likely, with new players offering new receivers the matter of incompatibility will likely become worse, not better. One bright ray of hope: New IRDs from Hyundai appear to cut across software limitations peculiar to specific programmers and show an ability to access virtually any MPEG-2 signal that is not operating in a conditional access (pay to view) mode.

Summary: Continued shortage of quality IRDs, cable TV units being more significantly in short supply than satellite. Satellite on the other hand more prone to compatibility problems with specific receivers designed for specific services being the rule, not the exception.

Subset: Sky Network (NZ) Ltd plan to expand to MPEG-2 digital programme delivery sometime middle to late 1998 is very much dependent upon availability of suitable IRD units for home consumers. Sky runs significant risk of selecting a receiver format too early and missing advantages of newer software that will be available in the future. (see DTH/Direct to Home, here)

Laserdiscs/ Dying Technology?

North America's largest Laserdisc distribution, Image Entertainment, saw net income drop from US\$2.43m in fourth quarter 1995 to US\$158,000 in 1996; all, it says, because of DVD. Firm blames *"confusion and uncertainty over future of Laserdisc format"* with much hyped arrival of digital video discs responsible for the 11% drop in gross sales.

LMDS

"Newest kid on the block" in the pay-TV world is LMDS or local multipoint distribution (service). LMDS operates in the 28 and 40 GHz frequency regions, portions of the spectrum considered beyond useful as recently as ten years ago. LMDS is a marriage between cellular telephone and MDS microwave distribution. Broad bandwidths (500 MHz or more) capable of transporting hundreds of TV programme channels are beamed from urban transmission sites to homes within 5 to 10 kilometres. Line of sight is necessary as the wavelengths are very short and will penetrate nothing solid. Actual transmission can be analogue or digital, the latter being the most practical. Receive antennas are tiny even by microwave standards - teacup in size, easily hung out of a window against the side of a building. By setting aside two separate spectrum portions, LMDS holds promise of being two-way in nature which means TV reception sites can "talk back" to the transmitters for direct ordering of movie, sport or other programming.

First licences are now being granted in USA, numerous countries have agreed in principal to allow similar licensing. At least two firms have made application for licences in New Zealand; one proposing use of 28 GHz region, another proposing 40 GHz. In its most basic form, this is cable TV without cable, satellite TV without complex or costly satellite dish system, interactive from the outset. Downside: The hardware to support it is only prototype and probably not economical at this point in time.

Thomson Multimedia Sell Off

French government owned and operated Thomson Multimedia has been on auction block for more than a year. Firm has massive debts, loses billions each year despite commanding leads in many areas of consumer electronics production and retailing. French government proposed selling consumer segments to Korean firm which in turn promised to expand in-France production and employment by more than

5,000 people. French pride was wounded at suggestion they could not stop haemorrhaging of funds through firm without non-French help and government was backed into corner where it agreed to try once again to find a way for the French firm to stay French in ownership. In marketplace, despite huge losses, Thomson continues to be innovator in satellite TV products, PC to TV convergence and Web-TV product areas.

TV Screen Display Technology

Cathode ray tube (CRT) technology has been the primary image display system since their initial development in the 1920s. Although 1997 CRTs are well advanced from the primitive tubes put into service in 1929, they are still (1) glass envelope, (2) bulky, (3) evacuated (vacuum), (4) physically awkward (to build, handle, ship and store). And they are, in an era of solid state, the last "vacuum tube" remaining in modern TV set design. LCD screens have challenged CRTs, but only in smaller size screens and then with limitations inherent in the liquid crystal display technology. Various projection screen systems rely on either CRT or LCD "source tubes" for their magnified images.

There are many pretenders to the display throne. None has yet hit upon the correct combination of technology and performance which will guarantee abandoning CRTs. Flat panel displays, describing a family rather than a single technology, offer the greatest promise but not anytime soon. Several separate approaches exist, some in prototype form and others in limited production runs. Plasma panels are typically 4"/100mm thick, designed to hang on a wall; the electronics of the TV / video imaging system is typically "hidden" inside of the framed panel out of sight. Plasma screen images (typically but not exclusively) 42" in size are available from a small but growing number of Asian (Fujitsu, Mitsubishi) and European (Grundig) sources in the US\$8-12,000 range. Early buyers are paying for the unique shape, little else and the actual plasma screens are sourced from Fujitsu.

Latest gee-whiz challenger to CRTs is American university research project using High Gain Emissive Display (HGED) technology. Creators claim HGED can produce display screens from 5-40" at costs lower than LCD, plasma or field-emission technologies. Numbers: HGED when fully in production believes it will cost US\$1.30 per square inch of display tube size which compares favourably with present LCD costs near US\$16 per square inch. Weight is another consideration - the 42" Grundig that will go on sale in September at US\$12,000 weighs 40 pounds while a 40" HGED will weight under 12 pounds.

Biggest production problem for LCD is failure of a single transistor in VLSI structure comprising thousands of transistors. If one transistor is bad, the entire LCD is scrapped. In HGED, a defective part can be replaced in quality control without endangering entire screen (the CRT requires an electron beam with companion magnets and deflection circuits; LCDs require huge array of individual transistors to illuminate individual image pixels while HGED uses expansive microprocessor technology to direct beam to specific pixel on display screen). Other HGED advantages - operating voltages and companion power supplies. Typical CRT requires 30,000 volt power supply, itself a source of both electrical shock and temperamental and expensive components. HGED runs on far more modest 100 volt source. Other advantages, unlike LCD screens, viewing angle is not critical and because of low voltage operation, potential emission from X-rays for near field viewing is eliminated. On negative side, HGED generates heat (LCD in comparison does not, CRT displays do) and display is under heavy vacuum - actually higher vacuum than typical CRT.

Bottom line: No serious challenge to present mix of LCD and CRT display TV sets or computer monitors is likely during coming 24 months.

Subset: Larger screen TV sets accounted for only 4% of US market volume (by number of units sold) in 1996 but 16% of revenues. According to US industry sources, 1996 projection sales were: 60" screen and larger/17% of sales, 50-59"/49%, 49" and down/34%. Average projection TV prices declined in 1996 settling in range of US\$990 for 40-46" display screens. Most of 1996 sales (62%) happened during 3rd and 4th quarter of year.

VHS-C v. 8mm

Battle of the formats continues in camcorder industry. VHS format machines outnumber 8mm (Beta, et al) by a wide margin in the home deck category, but not in the hand or palm -corder field. Primary advantage to VHS-C - tapes with adapter can play back on standard household VHS machine. Primary advantage to 8mm - tapes are physically smaller than VHS-C resulting in overall smaller camcorder units. 8mm tapes cannot be played back on VHS format equipment which means anyone wishing to build library must maintain two separate, not interchangeable formats.

8mm camera producers were first to jump on LCD display bandwagon and this hurt VHS-C sales in 1996. LCD display is either substitute for tiny viewfinder or is in addition to. Advantage of LCD display, typically 4" size, is that while shooting tape or immediately after shooting tape the images can be viewed on a screen large enough to share with multiple viewing eyes. 8mm format cameras were first to adopt LCD as a marketing tool; the world market for camcorders in 1997 is expected to be 50% filled with LCD models. VHS-C units have rushed to adopt same LCD technology.

Sony and Sharp pushed the 8mm LCD camcorders early, reaped benefits of public acceptance. Matsushita and JVC, major suppliers of VHS-C, were late to adopt LCD display technology but are now concentrating on broad line of camcorders with LCD feature.

Average pricing on LCD equipped camcorders is US\$800 world-wide but forecasts are pricing will drop to \$500 by first quarter 1998.

Sony is now onto next generation camcorders featuring "Laser Link" which allows the camcorder to "beam" recorded material directly to TV set over distance of 5 metres or less without hardwire connection. All of this is seen as market positioning for arrival of all digital format camcorders sometime during 1998. Sony admits it is rearranging current models to prepare for "drop in" of digital works "in lieu of analogue recording deck"; Sharp says it will bring out ten different all digital format camcorder models priced from US\$599m to \$2,699.

WebTV

Allowing the home TV receiver to access directly Internet (web sites) is the stated goal of a number of not related technology projects just now attracting media attention. Some of the systems offered are weak attempts to capitalise on the public's interest in "cruising the internet" and offer no real challenge to the existing internet access systems. Others may prove to be serious challengers for Internet revenue streams.

WebTV is a trademarked name of a US corporation which has created Internet browser software and a companion set-top box that converts the TV set into an Internet access device. WebTV claims 350 patents on various aspects of both the hardware and software in their system which basically amounts to an Internet browser system with telephone modem that uses the TV screen display as a substitute for a dedicated PC screen.

Motivation here are the tens of millions of homes that own a TV, are curious about Internet, but are unwilling to invest a thousand dollars or more to purchase a PC just to access Internet. Set-top unit sold with WebTV package is dedicated special purpose PC that basically only does Internet. TV screen is merely a display device, few other TV set functions are utilised. The size of the untapped market attracted many competitors to WebTV even before they formally begin shipping product. Foremost may be Sanyo which has been marketing web-surfing TV set system in Japan for several months with in-built 14.4 kbps (telephone) modem. In USA, WebTV has announced contract to provide service to more than 900,000 (US) rooms in 2,800 hotels during second half of this year through hotel entertainment and information services provider On Command. WebTV boxes built by Sony and Philips will be installed to act as "servers" and each room equipped with remote control and keyboard providing single-click access to high speed Internet connection. WebTV claims system will allow hotel guests to access Internet, receive e-mail, browse site-specific listings for hotel, neighbourhood, city areas. How guests will be charged for this service has not been announced.

US industry analysts predict 20 million consumers (world-wide) could gain access to Internet via non-PC devices (i.e., WebTV like systems) by the year 2002.

WebTV has two major contract backers: Sony and Philips. And between the trio are major plans to introduce WebTV to Asian and European markets very soon. There have been snags. WebTV uses encryption routine with a 128 bit string. That's a problem for exporting the technology outside of USA because US law prevents exporting any encryption strings greater than 56 bits. To deal with this, WebTV working with both firms has developed lower security 40-bit stream which will be inside of units shipped (exported) from USA.

Within USA, Sony and Philips WebTV systems are expected to carry price tag in region of US\$199 by September; presently they sell for as much as US\$500 where available. WebTV has not disclosed unit sales to date but it is believed to be in excess of 50,000 units.

One of the more unique-to-WebTV features of their system: Affordable cost of converting progressive scan text and graphics found within Internet world to high quality interlace display images. This has been a major cost stumbling block to other systems to date - a TV set may be already in the home and available for displays but the technology of TV displays and of computer displays are mutually exclusive. (See HDTV/Digital TV, here)

While WebTV may be collecting most of the publicity, they are by no means the only serious player in the game. WebTV is Internet without a (formal) PC; nothing more, nothing less. It still requires a telephone modem for connection to Internet and the telephone line charges for use of Internet that go with all existing Internet systems.

Another potential delivery system does not rely upon or even use the telephone network. German Broadcaster Deutsche Welle has been testing in Europe for more than one year, in Asia and the Pacific since March, "MediaNet" which delivers Internet to an appropriately equipped PC through a satellite TV connection. MediaNet is one of a family of Internet data transmission systems utilising portions of a standard TV picture which are otherwise unused. The 'VBI' (vertical blanking interval) segment of a TV image is at most under used by a handful of telecasters to broadcast "teletext" information to properly equipped consumer TV sets. The VBI has the capacity to also carry Internet into the home.

There is confusion because it utilises a portion of the TV broadcast signal as a carrier. MediaNet (and others with different names but working on the same principal) has no direct relationship to the TV set and in fact unlike WebTV, MediaNet does not utilise the TV set for a display system. Rather, MediaNet extracts the Internet data carried within the VBI portion of the broadcast out of the TV signal and hands it to a decoder box that conditions the data stream for use on a standard PC. In this sense, MediaNet is Internet without the telephone company as a data carrier. Anyone within reception range of a TV transmitter carrying MediaNet "piggy back" within its VBI can connect to Internet in this fashion.

As configured by MediaNet, Internet is one-way. The user has special (MediaNet provided) browsing software which allows the user to download, save or print virtually anything that MediaNet transmits within its Internet data service. All of this is done to a pre-announced schedule so unlike normal telephone modem Internet connections, the MediaNet user adjusts to having certain topics or categories of Internet available "on line" at different times of day. No user presence is required - the software is told what material the user wishes and when the transmission time appears, the software locates the requested data and saves it for later review by the user.

This is inexpensive for the user; unlimited access to Internet, 24 hours per day every day of the month, for figures in the range of A/NZ\$15 per month. And a decoder and software capital cost of under A/NZ\$200. The downside of this at the present time is the satellite dish receiving system which must be purchased to interconnect to the MediaNet data stream buried inside of the German Deutsche Welle TV broadcast stream.

An Australian based firm headquartered in Queensland claims to have purchased the "Asia-Pacific Rights" to MediaNet. At the same time several German manufacturers are promising combination satellite receivers and MediaNet decoder boxes which will allow satellite dish users to directly access the MediaNet service. One version of this promised includes a built-in telephone modem that will give the MediaNet user a limited capacity to "talk back to" and "order from" MediaNet specific Internet Web

Sites or files. The next logical step to follow would be to allow anyone with such equipment to also send and receive e-mail through the network as well. But the technology and business plan for this aspect of the system is not yet mature.

Yet another would-be competitor to Internet delivery outside of the telephone line modem connection is the US bred Hughes DirecPC service which began operating last September. Hughes, a major supplier of satellites and designer of the immensely successful DirecTV DSS/DTH service for North America, has been investing in similar operations elsewhere; Japan is included. And DirecPC is their companion (to DSS) delivery scheme to bypass the increasingly clogged telephone lines which the growth of Internet has spawned.

DSS in its present form involves a 21" satellite dish antenna with companion electronics. The first version electronics was in the form of a set-top box with a dish plus electronics price near US\$800. The latest versions at US\$400 places the electronics on a PC card which the user slides into an expansion port on the computer. The operation is as follows:

The satellite feed delivers Internet to the PC at a speed as much as 14 times faster than a telephone line modem.

The user modem "orders" through a toll free number specific Web Site or file information, or asks for the e-mail of the coded individual. The modem connection is for requests only and is therefore a relatively short connection and rapid burst of data.

The request goes to a central server which locates the requested data, routes it to the satellite for delivery to the specific PC requesting it through an encryption routine that blocks that data to other users.

The user PC connected dish system receives the data just as it would through a dial up ISP connected modem, but at greater speed, and it goes directly to hard drive or disc for review and either storage or browsing.

What is better here is speed, not necessarily cost since Hughes charges the satellite connected PC user essentially the same level of rates as would be paid through a modem in-modem out connection system. Hughes says their customers pay from US\$10 to US\$140 per month for various levels of service; levels determined by the amount of data ordered and received on a monthly billing cycle. Hughes has shown some interest in exporting this service elsewhere in the world, has formed a partnership with several Japanese firms to deliver a similar service to Japan via PanAmSat PAS-2 during 1997.

Satellite TV & Radio

Nokia brand MPEG-2 receivers are now available in so many "formats" it appears the Sweden factory has lost track of what each one does. Rash of European software activity with private software firms not associated with Nokia bringing out new software routines that can be loaded into basic 9500 S model is causing considerable confusion in Europe and throughout the world. Basic problem: The factory in Sweden is concentrating only on new software routines which involve significant new receiver sales. At the same time, software creators outside of Nokia are tackling niche markets which are too small to attract the interest of Nokia itself. Result: Dozen or more, often undocumented, software version IRDs all starting off as basic Nokia 9500 S. Nokia is attempting to deal with matter by issuing new versions of its own, including 9200, 8600 and perhaps others. Model numbers alone do not tell you what you are getting - more important is software version number. Here is where real confusion lies as software designers outside of Nokia are creating their own often self-assigned numbering system. Chaos is result. Rule of thumb: If the claims for a version seem to good to be true, they probably are. More important, what backup (if any) can the buyer expect after purchasing the unit? As often as not a software designer acquires handful of units, modifies software as he or she wishes, releases version and then disappears behind Internet address never to be heard from again. Factory says it will not service units which have been software tampered by unauthorised persons or firms. Factory owns up to specific versions for China (does SCPC and some MCPC as well), various European services (such as the d-box version) and to date very limited production runs for AsiaSat 2 EBB bouquet. Virtually everything else has been "privately" created.

Hyundai HS100 series receivers follow trail similar to Nokia but with less private created software - to date. Hyundai is the receiver much anticipated because prototypes in hands primarily of would-be Australian distributors have been found capable of accessing at least some of the PowerVu MPEG bouquets. There are serious caveats. The

TECHNOLOGY BYTES

...BITS and BYTES you may have missed in the rush to make a dollar ...

April 24, 1997 ♦ VOLUME 97-3-36

HS100C is a for-China version (thus the "C") which is intended to do the 11 SCPC (+ 1 MCPC) Chinese regional TV service packages. Prototypes also receive the SA PowerVu non-conditional-access services on PAS-2 but with a serious "glitch"; the video does periodic freeze-frame and according to reports the voice track is not synchronised with the video track (readily apparent when watching a "talking head" telecast). Another glitch reported - when accessing PowerVu services, after selecting specific bouquet (such as California package) the receiver on command zips through the FTA programme channels (advising on CA channels "Not available") but when it arrives at last programme channel refuses to recycle to lowest channel without user entering special command. As recently as April 18th Hyundai factory was telling one major Australian distributor, *"We have not taken the time to see if the software can be modified to correct this problem."* None the less, at least one Australian distributor was anticipating factory delivery of quantity of Hyundai receivers for resale in DTH market on April 22nd and was pre-advertising the units as "PowerVu capable." A second Australian distributor claims that Hyundai has already created software to correct the out-of-sync video and audio on PowerVu services and says his prototype unit does not have this artefact. The Hyundai factory will not discuss the status of this receiver product as CTD goes to press. At the very least, there are going to be some disappointed buyers of the early release Hyundai receivers if they receive units which do not produce appropriate quality free to air PowerVu in addition to the designed-for Chinese and European bouquets. "C" version units appear to have the capacity to load maximum of 60 bouquets with up to 9 programme channels per bouquet; one report claims they come out of the box pre-programmed for at least the 11 Chinese services and perhaps others as well. The "C" version appears to be available for A\$800 from at least one source (Antares Satellite Products, tel 61-7-3205-7574) and the later version which claims not to have PowerVu synchronisation problems is priced at A\$1295 (Pacific Satellite at tel 61-7-3344-3883).

Bloomberg Informational service has appeared on PAS-2, Ku-band, horizontal (opposite to normal PAS-2 Ku band transmissions) in free to air analogue format. Reason has not been explained, but 60cm dish in Auckland region reports "P3" reception while 1m dishes report perfect quality. Service is at 12,365 MHz and is also reported by Australians to our sister publication SatFACTS Monthly. On April 21 the same FTA analogue feed also appeared without explanation on PAS-2 C-band (1405 Hz).

Latest MPEG-2 family digital IRDs are on display at UK Cable & Satellite Show (ran April 21-23). New brands to be on hand for first time - Daewoo which is also acting as a production source for a number of familiar (it not huge in volume) analogue receiver firms headquartered in Europe and Asia.

Thaicom 3 satellite went into air April 16th, is heading for 78.5E where it will bring significant new C-band coverage into operation including virtually all of Australia. Already at 78.5E, Thaicom 1 and 2 satellites which have limited C plus Ku band capacity on board in shared cross-pole orbit spot. Under original plan, Thaicom 1 will be moved to 120E region where it will continue to supply at least Ku-band coverage; future of C-band from that location not announced. C-band coverage from 120E, if activated, will be of little interest to areas south of the equator as beam was designed for SE Asia only, from 78.5E.

Canadian Television News Agency and CTV Network began transmitting special feed of "all major news events in North America" backed up with "specialised reports from news bureaus in Middle East, Russia, China and the USA" Monday April 21. Feed, total length unknown but apparently at least 30 minutes, is scheduled for 0730 UTC (1920 NZ, 1730 AEST) each Monday, Wednesday and Friday on PAS2, transponder 8C, Channel 2 in NTSC. This

-Abbreviated format for BITS and BYTES-

The content of this issue of CTD, bringing readers to a current status report on matters affecting the telecommunications industry, is directly responsible for the considerably shorter "**BITS & BYTES**" section of this issue.

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translates to the California bouquet service of PowerVu (RF3901) at Msym 30.800 and FEC 3/4. Service is presently running "fixed key" (i.e., anyone with a PowerVu receiver can access it); target audience is apparently cable TV and broadcast firms within range of PAS-2. Information from tel 1-514-495-6138, fax 1-514-273-5338 and email codevppb@sympatico.ca.

Where the dollars are. TVSN shopping channel distributed via PAS-2, As2 in free to air analogue, is now being distributed in 30+ countries throughout Asia and Pacific. Some of the sales results are of interest. 90% of all sales come from Australia. The next largest market is Philippines, then Japan, Indonesia and Guam. New Zealand does not even rate a mention. During March, 14% of all sales went to "first time shoppers" while 60% of all sales are from repeat customers. TVSN is pushing hard for additional cable TV affiliates in the Philippines, hosted recent trade association Golf Tournament there. Top 5 selling products during March: (1) Heart of Gold Crystal Pendant, (2) Two litre cordless kettle, (3) Conair Cordless Massage Wand, (4) Zodiac Crystal Sun Catcher, (5) Sequin 23cm Ceramic Clown Doll. TVSN is carried by contract with a number of UHF telecasters and cable TV in three markets. Nobody in NZ believes the service is attracting significant viewers or sales here.

Rupert Murdoch plan with EchoStar to launch regional "spot beam" DTH service for as many as 75 separate North American DBS markets is coming into clearer focus. Murdoch told US government committee studying proposal he plans to charge US\$29.95 per month for basic service (some \$10 less per month than most existing US DBS services), would lease or rent "decoder" top homes for US\$5 per month (a good trick when the decoder [IRD] will cost them more than US\$400 each!), and they will use combination of spot beams and smart card authorisation routine to determine which TV stations will go into each markets. Weak side of that - out of market TV programming could easily be "imported" across market lines by simply having possession of card from adjacent market area.

NBC Asia is launching special channel on Japanese DirecTV International (DTV) home DBS service in last quarter of year. Service will combine NBC Asia, CNBC and MSNBC into single 24 hour day for distribution to Japanese homes. DirecTV International is the planned Hughes co-owned service scheduled for operation in second half of year.

PAS-2 Ku-band capacity, of which 4 transponders were reported unsold and available early in April, now seems to be gone. If true, the next available PanAmSat C or Ku transponder space to be available will have to occur after PAS-8 is launched (now scheduled mid-1998). If PAS-2 Ku is really all gone, probable tenant for remaining transponders is international group planning direct competition to Optus and Telstra for Australian telecommunications business post July 1st.

Digital TV & Radio

"Cliff effect" of digital telecasting is subject of intensive study by American National Association of Broadcasters (NAB). Here is problem. With analogue television transmission, picture quality gradually lessens until snow (noise) interferes with image and audio to extent reception is no longer commercial in quality. Digital transmission uses forward error correct technique to replace impaired transmission information with redundant information from prior transmission frames. When number of errors (too much noise) reaches point where forward error correction can no longer create image from remaining picture bits, reception simply shuts off. There is no such thing as a noisy or impaired digital transmission. There is to-the-eye perfect reception, and then there is no reception at all; i.e., "the cliff effect." Virtually all spectrum planning for analogue TV has accepted that TV transmissions travel further than they can be actually used as commercial signals; this "fringe area" coverage is basically a no-use region where service is not good enough to be commercial but too good to start all over again using the same channel from a new transmitter site. In digital, accurate knowledge of precisely where the "cliff effect" occurs has a significant bearing on how individual channels are allocated for use and reuse over a region (country). NAB wants to know more about the variations in "cliff effect" and how weather changes, uneven terrain, unpredictable transmission paths will cause potential interference to "primary coverage areas" being worked out on channel allocations scheme. There will be no "fringe areas" for digital terrestrial TV but there could well be significant regions that are simply not usable for a specific channel because of the unstable nature of the point where the cliff effect actually occurs.

How much signal is required for quality HDTV reception? In analogue format, signal to noise ratio for blemish free image is in region of 40 dB. Whopping discount is in store for HDTV/digital where (US) FCC is engineering channel allocations around 7 dB S/NR minimum as standard for acceptable service. Earlier proposals had suggested 10 dB S/NR but armed with practical test results, this number has been reduced. Translation to already existing satellite TV model - not surprisingly, numbers are almost identical. A C/NR (which roughly translates to S/NR for terrestrial service) of 6 dB is considered "cliff point" for reliable DTH/satellite TV reception.

Agreement between European Broadcasting Union (EBU) and US based Society of Motion Picture Engineers relating to "international digital programming exchange" has surprise. Initially, both sides believed there would have to be a standard "compression protocol" to allow seamless transfer of programme material. Now EBU and SMPTE agree, "*Most compression systems are self-identifying and can in fact tell successive equipment how to process the signals.*" In effect, allow programme exchanges to adopt their own compression "standard" but give users further down the chain basic compression detail (contained in data stream) to allow each station or user to decompress and then recompress digital format video (audio) to suit their own needs.

Cable movie network HBO claims, "*Average viewer cannot tell difference between SDTV (standard definition TV image) and HDTV on screen sizes smaller than 27.*" HBO does not plan early conversion to HDTV, believes that if the viewers are given a choice between 16:9 SDTV and HDTV, 90% will opt for 16:9 image. HBO says they will not be the first to adopt HDTV in the pay cable arena, but will watch the progress of commercial TV to see what the ultimate acceptance by the public turns out to be. In conflicting study, 71% of public surveyed said they would be willing to pay (US)\$500 more for an HDTV TV set, 18% said they would pay \$1,000 more, 5% \$2,000 more. Interesting point about this study - all of those studied had in fact seen closed circuit showing of HDTV against same transmission in SDTV and were reacting to what they had just viewed on test TV screens.

Consumer Electronics

Blockbuster Video, world's largest chain of home video tape rental stores, is putting corporate toe in the water with DVD (digital video disc) products. Sixteen stores in 6 markets will offer movies on disc for both rental and sale, the rental programme being contrary to what other retailers are pushing. Blockbuster is carrying Warner Home Video (WHV) product as well as supplying store floor space for special Sony created sales kiosks that will push new Sony DVD players and Columbia TriStar movie titles on disc. Officially, only 7 (US) markets have DVD at this time and most of the early entrant hardware and software suppliers are at least co-operating to retain distribution to those 7 markets. However, there is already a lively business in trans-shipping players and discs to locations outside of the 7 "authorised" markets and one spokesman for WHV observed, "*We cannot believe there is an 11 to 1 ratio of (DVD) discs to players being sold!*".

IBM is joining competitors Compaq, AST, Monorail and Packard Bell with US\$999 home PC system. IBM will introduce new "entry level" home computer package sometime after July 1 in US market, shortly after elsewhere in world. IBM will base new US model on European Aptiva E model which has lowest list price of US\$1,500 at the present time in Europe.

Microsoft has invested US\$425m in acquiring the stock of WebTV; sale to be completed by mid-winter. WebTV will give Microsoft an immediate foothold to allow it to attempt to make Windows CE the operating system standard for Internet equipment world-wide. Microsoft says it will continue to support the WebTV agreements with Sony and Philips.

Cable/Fibre/MMDS/Pay TV

ESPNNews is new 24 hour sport news channel service scheduled for launch later this year. Service will not actually cover sporting events live, but will feature constantly updated reports of "world of sport" and include related talk back and group participation programming created around sporting topics. Service is under consideration for carriage by Sky Network for digital service package planned for satellite distribution in New Zealand late in 1998.

Terrestrial Broadcasting

While TV3's new "TV4" is targeting late June sign-on for their new programming channel, not all of the pieces are in place. Significant problem exists between Auckland and Hamilton coverage areas where VHF channel spectrum is at a premium. Of greater interest, the entire VHF allocation scheme (which has been the private preserve of TVNZ and TV3 to date) is now under review with "several plans" advanced to "drop in" VHF spectrum users on unused VHF TV channels in major cities. The new "users" would most probably not be traditional analogue television - digital TV is one possibility as are other non-television uses and users. At the end of this new flurry of activity are potential major problems for TVNZ and TV3 when (not if) they are forced to consider remodelling their own plants from analogue to digital format television technology. It may well be that when the "national" networks finally are ready to move to digital there will be no VHF spectrum available for the move. Ooops.

Triangle Community Television is beginning serious planning for launch of UHF channel television service in Auckland region. Service received permit from Ministry of Commerce to operate "non-commercial" public service television station. Station says it will strive to broadcast television programming "not on offer elsewhere" and will provide "public access" television opportunities to groups who have been unable to secure transmission time on the existing VHF and UHF outlets. In the mix - plan to provide redistribution of satellite fed programming originating in other regions of the world. (Hans Versluys, Director at tel 64-9-358-0426, fax 64-9-300-5035)

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